CLAIMS

1   1.   A method of backing up and restoring data in a computer system, the method
2 comprising:
3   defining a logical backup object;
4   specifying one or more collapsed extents; and
5   recording details of the collapsed extents.

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1   2.   The method of claim 1 further comprising:
2   starting data movement between a host and the backup and restore system; and
3   monitoring data movement.

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1   3.   The method of claim 2 further comprising:
2   receiving a completed signal; and
3   in response to the completed signal, halting the monitoring of the data movement.

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1   4.   The method of claim 2 further comprising repeatedly defining a logical backup
2 object, specifying extents, starting data movement, recording details of the specified
3 extents and monitoring data movement from a first storage unit to a second storage unit
4 until all data is transferred to the second storage unit.

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1   5.   The method of claim 2 further comprising restoring data by:
2   creating empty objects to restore into;
3   discovering the extents of the empty objects;
4   reading the extents of the backup objects; and
5   specifying a mapping from backup extents to restore extents wherein at least one
6 of the extents corresponds to a collapsed extent.

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1   6.   A method of backing up data used in a computer system having a client, a primary

2   storage system and a backup storage system, the method comprising:

3   discovering one or more actual extents on the primary storage system;

4   collapsing the extents; and

5   specifying the collapsed extents to the backup storage system.

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1   7.   The method of claim 6 wherein collapsing the extents comprises:

2   identifying a pattern in the actual extents discovered on the primary storage

3   system; and

4   generating a representation of files specified by the actual extents which is more

5   compact than the representation provided by the actual extents and defining the

6   representation as a collapsed extent.

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1   8.   A method of restoring data from a backup and restore system to a host, the

2   method comprising:

3   creating empty objects on host to restore into;

4   discovering the extents of the empty objects;

5   reading the extents of the backup objects; and

6   specifying a mapping from backup extents to restore extents wherein at least one

7   of the extents corresponds to a collapsed extent.

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1   9.   The method of Claim 8 wherein specifying a mapping comprises specifying pairs of

2   extents which identify the backup extents and the restore extents.

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1   10.   The method of Claim 8 wherein specifying a mapping comprises:

2   identifying whether both back up and restore extents is striped;

3   in response to both the back up and restore extents being striped, identifying

4   whether both back up and restore extents have the same column width and column count;

5   in response to both the back up and restore extents being striped, identifying

6   whether both back up and restore extents start at the beginning of a stripe element;

7   compute a number of repetitions; and

8   generate a single restore extent for the number of repetitions.

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1   11.   The method of Claim 8 further comprising:

2   monitoring data movement.

3   receiving a complete signal; and

4   in response to the completed signal halting the monitoring of the data movement.

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1   12.   A backup and restore system for backing up and restoring files to and from a

2 primary storage system coupled to a client, the backup and restore system comprising:

3   a processor for defining a logical backup object;

4   a collapsed extent processor for specifying collapsed extents;

5   means for starting data movement; and

6   an extent recording processor for recording details of collapsed extents.

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1   13.   The system of claim 11 further comprising means for logically restoring a logical

2 element from a segment of storage on the primary storage system.

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1   14.   The system of claim 12 further comprising a processor for specifying a mapping

2 from backup extents to restore extents wherein at least one of the extents corresponds to a

3 collapsed extent.

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1   15.   The system of claim 13, wherein said means for logically restoring comprises:

2   means for creating empty objects to restore into;

3   means for discovering the extents of the empty objects;

4   means for reading the extents of the backup objects; and

5   means for specifying a mapping from backup extents to restore extents wherein at

6 least one of the extents corresponds to a collapsed extent.

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1   16.   The system of claim 13, wherein the means for logically restoring comprises means

2 for specifying pairs of extents which identify the backup extents and the restore extents.